

Claims

- [c1] A framework for a deployable antenna, said framework comprising:
 - a hub;
 - a plurality of elongate ribs each having a proximal end and a distal end; and
 - a matching plurality of foldable resilient members interconnecting the proximal ends of said elongate ribs to said hub.
- [c2] A framework according to claim 1, wherein said deployable antenna is a mesh reflector type antenna.
- [c3] A framework according to claim 1, wherein said hub comprises metal.
- [c4] A framework according to claim 1, wherein said hub comprises non-metallic fibers embedded within a resin matrix.
- [c5] A framework according to claim 4, wherein said non-metallic fibers comprise carbon in its allotropic form of graphite, and said resin matrix includes a type of resin selected from the group consisting of an epoxy resin, a cyanate ester resin, and a thermoplastic resin.

- [c6] A framework according to claim 1, wherein said hub is structurally adapted for being mounted on a space travel vehicle selected from the group consisting of an orbiter, a satellite, a spacecraft, a space probe, a spaceship, a space shuttle, and a space station.
- [c7] A framework according to claim 1, wherein each of said elongate ribs comprises non-metallic fibers embedded within a resin matrix.
- [c8] A framework according to claim 7, wherein said non-metallic fibers comprise carbon in its allotropic form of graphite, and said resin matrix includes a type of resin selected from the group consisting of an epoxy resin, a cyanate ester resin, and a thermoplastic resin.
- [c9] A framework according to claim 1, wherein each of said foldable resilient members is substantially monolithic.
- [c10] A framework according to claim 1, wherein each of said foldable resilient members comprises non-metallic fibers embedded within a resin matrix.
- [c11] A framework according to claim 10, wherein said non-metallic fibers comprise carbon in its allotropic form of graphite, and said resin matrix includes a type of resin selected from the group consisting of an epoxy resin, a

cyanate ester resin, and a thermoplastic resin.

- [c12] A framework according to claim 1, wherein each of said foldable resilient members has a shape substantially resembling a hollow tube segment.
- [c13] A framework according to claim 12, wherein said hollow tube segment has a cylindrical wall including at least one elongated slot defined therethrough.
- [c14] A framework according to claim 1, wherein each of said foldable resilient members is capable of storing strain energy whenever forcibly folded and also releasing said strain energy whenever subsequently permitted to elastically unfold.
- [c15] A framework according to claim 14, said framework further comprising a removable restraint for collectively holding said elongate ribs in a captured position wherein said foldable resilient members are forcibly folded such that the distal ends of said elongate ribs are thereby proximately situated together.
- [c16] A framework according to claim 15, wherein said elongate ribs are substantially parallel with each other when held in said captured position.
- [c17] A framework according to claim 16, wherein said elon-

gate ribs are collectively stowable in a substantially cylindrical volume when held in said captured position.

- [c18] A framework according to claim 15, wherein said strain energy drives automatic deployment of said deployable antenna, whenever said removable restraint is removed from said elongate ribs, by forcibly unfolding said fold-able resilient members in an elastic manner such that said elongate ribs are thereby splayed apart in a released position.
- [c19] A framework according to claim 18, wherein said elongate ribs longitudinally radiate from said hub in a substantially circumferential manner when in said released position.
- [c20] A framework according to claim 18, said framework further comprising a matching plurality of elongate outriggers each having a tension-bearing end, a load-bearing end, and a middle section interconnecting said load-bearing end to said tension-bearing end, wherein the middle sections of said elongate outriggers are pivotally mounted on said distal ends of said elongate ribs.
- [c21] A framework according to claim 20, wherein each of said elongate outriggers comprises non-metallic fibers embedded within a resin matrix.

- [c22] A framework according to claim 21, wherein said non-metallic fibers comprise carbon in its allotropic form of graphite, and said resin matrix includes a type of resin selected from the group consisting of an epoxy resin, a cyanate ester resin, and a thermoplastic resin.
- [c23] A framework according to claim 20, said framework further comprising a matching plurality of tensioning cables attached to the tension-bearing ends of said elongate outriggers.
- [c24] A framework according to claim 23, said framework further comprising radial catenary cables, substantially circumferential catenary cables, tie-down cables, and a net, wherein said radial catenary cables, said substantially circumferential catenary cables, and said tie-down cables cooperatively suspend said net between the load-bearing ends of said elongate outriggers whenever said elongate ribs are in said released position and said tensioning cables are sufficiently tensioned.
- [c25] A framework according to claim 1, wherein said deployable antenna includes a mesh attachable to a net and comprising a flexible material suited for reflecting electromagnetic waves within the radio frequency spectrum.
- [c26] A framework according to claim 25, wherein said flexible

material comprises woven, gold-plated molybdenum wire.

- [c27] A framework for a deployable antenna, said framework comprising:
a hub;
a plurality of elongate ribs each having a proximal end and a distal end; and
a matching plurality of foldable resilient members interconnecting the proximal ends of said elongate ribs to said hub;
wherein each of said foldable resilient members comprises non-metallic fibers embedded within a resin matrix and is capable of storing strain energy whenever forcibly folded and also releasing said strain energy whenever subsequently permitted to elastically unfold.
- [c28] A framework according to claim 27, wherein said non-metallic fibers comprise carbon in its allotropic form of graphite, and said resin matrix includes a type of resin selected from the group consisting of an epoxy resin, a cyanate ester resin, and a thermoplastic resin.
- [c29] A framework for a deployable antenna, said framework comprising:
a hub;
a plurality of elongate ribs each having a proximal end

and a distal end; and

a matching plurality of foldable resilient members interconnecting the proximal ends of said elongate ribs to said hub;

wherein each of said foldable resilient members has a shape substantially resembling a hollow tube segment and is capable of storing strain energy whenever forcibly folded and also releasing said strain energy whenever subsequently permitted to elastically unfold.

[c30] A framework according to claim 29, wherein said hollow tube segment has a cylindrical wall including at least one elongated slot defined therethrough.

[c31] A deployable antenna comprising:
a framework including a hub, a plurality of elongate ribs each having a proximal end and a distal end, and a matching plurality of foldable resilient members interconnecting the proximal ends of said elongate ribs to said hub; and
a mesh suspended from the distal ends of said elongate ribs.

[c32] A deployable antenna according to claim 31, wherein each of said foldable resilient members comprises non-metallic fibers embedded within a resin matrix.

[c33] A deployable antenna according to claim 31, wherein each of said foldable resilient members is capable of storing strain energy whenever forcibly folded and also releasing said strain energy whenever subsequently permitted to elastically unfold.

[c34] A deployable antenna according to claim 31, wherein said mesh comprises a flexible material suited for reflecting electromagnetic waves within the radio frequency spectrum.

[c35] A deployable antenna according to claim 34, wherein said flexible material comprises woven, gold-plated molybdenum wire.

[c36] A satellite comprising:
a body; and
a deployable antenna mounted on said body and including a framework and a mesh;
wherein said framework includes a hub, a plurality of elongate ribs each having a proximal end and a distal end, and a matching plurality of foldable resilient members interconnecting the proximal ends of said elongate ribs to said hub; and
wherein said mesh is suspended from the distal ends of said elongate ribs.

- [c37] A satellite according to claim 36, wherein each of said foldable resilient members comprises non-metallic fibers embedded within a resin matrix.
- [c38] A satellite according to claim 36, wherein each of said foldable resilient members is capable of storing strain energy whenever forcibly folded and also releasing said strain energy whenever subsequently permitted to elastically unfold.
- [c39] A satellite according to claim 36, wherein said mesh comprises a flexible material suited for reflecting electromagnetic waves within the radio frequency spectrum.
- [c40] A satellite according to claim 39, wherein said flexible material comprises woven, gold-plated molybdenum wire.
- [c41] A method for stowing and deploying a rib-supported mesh reflector antenna, said method comprising the steps of:
interconnecting the proximal ends of a plurality of elongate ribs to a common hub with a matching plurality of foldable resilient members;
suspending a commonly held reflective mesh from the distal ends of said elongate ribs;
applying a removable restraint to said elongate ribs to

thereby hold and stow said elongate ribs in a captured position wherein said foldable resilient members are forcibly folded such that said distal ends of said elongate ribs are proximately situated together; and removing said restraint from said elongate ribs so that strain energy, stored within said foldable resilient members when forcibly folded, forcibly unfolds said foldable resilient members in an elastic manner such that said elongate ribs are thereby splayed apart in a released position and said reflective mesh is automatically deployed.